



**Australian Government**

# **ICTTEN609 Produce and evaluate architecture designs for convergent cellular mobile networks**

**Release: 1**

# ICTTEN609 Produce and evaluate architecture designs for convergent cellular mobile networks

## Modification History

| Release   | Comments                                                                                                     |
|-----------|--------------------------------------------------------------------------------------------------------------|
| Release 1 | This version first released with ICT Information and Communications Technology Training Package Version 2.0. |

## Application

This unit describes the skills and knowledge required to specify design of the required mobile cellular general packet radio service (GPRS), third-generation (3G) and fourth-generation (4G) network architectures.

It applies to individuals with high-level technical skills who design and operate mobile wireless systems that meet the industry implementation of wireless convergence in telecommunications.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

## Unit Sector

Telecommunications – Telecommunications Networks Engineering

## Elements and Performance Criteria

| ELEMENT                                                    | PERFORMANCE CRITERIA                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Elements describe the essential outcomes.</i>           | <i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>                                                                                                                                                                                                                                                                                                                                                |
| 1. Plan and prepare for design of cellular mobile networks | 1.1 Analyse requirements of the mobile network<br>1.2 Examine technical characteristics of the GPRS systems<br>1.3 Develop network architecture for a GPRS network, in addition to the circuit-switched domain of 2G (Generation)<br>1.4 Review 3G structure and identify network requirements to provide a wide variety of services ranging from voice and paging services to interactive multimedia, including teleconferencing and internet access |

| ELEMENT                                                                  | PERFORMANCE CRITERIA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                          | <p>1.5 Examine technical characteristics, data rates, operating frequencies and multiplexing schemes of the 3G system</p> <p>1.6 Establish positioning and types of antennas, terminals, processors, required protocols and architecture, based on technical specifications and requirements</p>                                                                                                                                                                                                                                                                                                                                   |
| 2. Design a GPRS (2.5G) cellular network                                 | 2.1 Investigate how 2.5G GPRS overlays the GSM network to transmit and receive transmission control protocol (TCP) and/or internet protocol (IP) based data to and from GPRS mobile devices                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 3. Design a 3G cellular network                                          | <p>3.1 Develop network architecture for a 3G network and explain functions of the network elements</p> <p>3.2 Integrate a 3G network with a wireless local area network (WLAN)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 4. Research and evaluate design features of proposed 4G cellular network | <p>4.1 Investigate how a fully IP-based 4G system will provide an end-to-end IP integrated solution for voice, data and streamed multimedia to end-users roaming anytime and anywhere</p> <p>4.2 Investigate access schemes of a 4G network</p> <p>4.3 Investigate the implication for Internet Protocol version 6 (IPv6) in relation to 4G support of a greater number of IP-based wireless devices with applications for improved multicast, security and route minimisation capabilities</p> <p>4.4 Investigate use of advanced antenna systems to enable 4G with high rate, high reliability and long range communications</p> |
| 5. Produce reports for architectural design for cellular networks        | <p>5.1 Present a report on the impact of competing technologies on each other and get consensus on concepts</p> <p>5.2 Investigate potential interoperability and global roaming issues that may be faced by GSM, 2.5G, 3G and 4G cellular technologies</p>                                                                                                                                                                                                                                                                                                                                                                        |

## Foundation Skills

*This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.*

| Skill   | Performance Criteria   | Description                                                                                                                                               |
|---------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reading | 1.1, 4.1-4.4, 4.6, 5.2 | <ul style="list-style-type: none"> <li>Comprehends and evaluates technical specifications to plan and prepare for complex cellular design work</li> </ul> |

|                    |                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Writing            | 1.3, 5.1                             | <ul style="list-style-type: none"> <li>Prepares clear and concise workplace documentation, including reports and recommendations, incorporating technical language to communicate complex information clearly and effectively</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Oral Communication | 5.1                                  | <ul style="list-style-type: none"> <li>Uses specific and relevant language to clearly articulate technological issues</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Numeracy           | 1.5                                  | <ul style="list-style-type: none"> <li>Extracts and evaluates technical data, including equipment specifications during testing phase</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Get the work done  | 1.1-1.6, 2.1, 3.1, 3.2, 4.1-4.4, 5.2 | <ul style="list-style-type: none"> <li>Plans strategic priorities and outcomes within a flexible, efficient and effective context in a diverse environment exposed to competing demands</li> <li>Considers strategic and operational potential of digital trends to achieve work goals, enhance work processes and create opportunities</li> <li>Uses systematic, analytical processes in complex, non-routine situations, setting goals, gathering relevant information, and identifying and evaluating options against agreed criteria</li> <li>Uses formal, analytical and lateral thinking techniques for diagnosing problems and generating and evaluating possible solutions</li> </ul> |

## Unit Mapping Information

| Code and title<br>current version                                                           | Code and title<br>previous version                                                            | Comments                                         | Equivalence status |
|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------|--------------------|
| ICTTEN609 Produce and evaluate architecture designs for convergent cellular mobile networks | ICTTEN6169A Produce and evaluate architecture designs for convergent cellular mobile networks | Updated to meet Standards for Training Packages. | Equivalent unit    |

## Links

Companion Volume implementation guides are found in VETNet - <https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2>

# Assessment Requirements for ICTTEN609 Produce and evaluate architecture designs for convergent cellular mobile networks

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## Performance Evidence

Evidence of ability to:

- provide a detailed summary of the client's business domain when designing network
- provide a detailed summary of current industry-accepted network hardware and software products and their general features and capabilities, when designing a general packet radio service (GPRS) (2.5G) and 3G network
- design viable GPRS (2.5G) and 3G network solutions to meet particular business needs
- research design features of 4G cellular networks.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

## Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- outline general features and capabilities of current industry security products, devices and procedures
- provide detailed information regarding global system for mobile (GSM), GPRS (2.5G) and 3G network design
- provide a detailed summary of current industry-accepted cellular mobile network protocols
- summarise technical characteristics of GPRS systems including:
  - capability classes and multi-slot classes
  - coding schemes
  - data rates
  - management systems when evaluating roaming features
  - operating frequencies and modulation schemes

- remote user issues when establishing siting and types of antennas, terminals, processors, required protocols and GPRS (2.5G) and 3G network architecture, based on technical specifications and user requirements
- explain concepts of three or more current industry network development and design methodologies used when designing networks.

## Assessment Conditions

Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances should be typical of those experienced in the telecommunications networks engineering field of work and include access to:

- cellular mobile network structures
- client requirements
- expected traffic volume
- information on a range of IT business solutions
- technical specifications
- vendors and vendor offerings and pricing.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

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